

**Leggere sempre le istruzioni prima dell'installazione**  
**Always read the instructions before the installation**

Italiano

# **YOSHI® AWS E1/E1J**

## **Yoshi Air Water System**

### **MANUALE DI INSTALLAZIONE – INSTALLATION MANUAL**

#### **8-10-13-16-20-25 HP**



English

**Al termine dell'installazione, far sempre eseguire il primo avviamento dal  
Centro di Assistenza Tecnica Autorizzato AISIN di zona.**

***After the installation, always call the local AISIN Authorised Service Centre to perform the outdoor  
and indoor units commissioning.***



# DICHIARAZIONE CE DI CONFORMITA'

CE DECLARATION OF CONFORMITY



**Dati identificativi del fabbricante:**  
**Identification of the manufacturer:**

Tecnocasa s.r.l.

Sede legale:

Via Manzoni, 17  
60025 Loreto (AN)  
Italia

Dichiara che l'insieme per la macchina YOSHI AWS (Air Water System)  
*Declare that the assembly for the YOSHI AWS (Air Water System) unit:*

Modelli:	AWS08HP E1/E1J AWS10HP E1/E1J AWS13HP E1/E1J AWS16HP E1/E1J AWS20HP E1/E1J AWS25HP E1/E1J	Matricola: vedi targa dati Serial n°: see product label	Anno di costruzione: vedi targa Year of construction: see product label
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È conforme ai requisiti essenziali di sicurezza delle seguenti direttive:  
*Is compliant to the essential safety requirement of the following directives:*

- ✓ DIRETTIVA PED 97/23/CE e successive modifiche – Cat. Rischio I° –  
(*PED DIRECTIVE 97/23/CE and subsequent modification – Cat. Risk I°*)
- ✓ DIRETTIVA MACCHINE 2006/42/CE e successive modifiche  
(*MACCHINE DIRECTIVE 2006/42/CE and subsequent modification*)
- ✓ DIRETTIVA BASSA TENSIONE LVD 2006/95/CE e successive modifiche  
(*LOW TENSION DIRECTIVE LVD 2006/95/CE and subsequent modification*)
- ✓ DIRETTIVA COMPATIBILITA' ELETTROMAGNETICA EMC 2004/108/CE e successive modifiche  
(*ELECTROMAGNETIC COMPATIBILITY DIRECTIVE EMC 2004/108/CE and subsequent modification*)

Loreto, 1° Gennaio 2012

Rappresentante Legale  
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# YOSHI® AWS E1/E1J

## Yoshi Air Water System AWS INSTALLATION MANUAL 8 HP-10 HP-13 HP-16 HP-20 HP-25 HP

### Models

AWS		Capacity (kW)	
		COOLING	HEATING (Maximum)
E1/E1J Series	8 HP	21,0	23,5
	10 HP	26,5	30,0
	13 HP	33,5	37,5
	16 HP	41,0	47,5
	20 HP	52,0	60,0
	25 HP	63,5	75,0

### ■ Safety prescriptions

The following symbols are used to indicate important instructions. Always read, understand and follow these instructions carefully.

	<b>WARNING</b>	Failure to observe the prescriptions indicated with this symbol could result in serious injury or death.
	<b>CAUTION</b>	Failure to observe the prescriptions indicated with this symbol could result in damage to the unit.
		This symbol indicates a forbidden action.
		This symbol indicates a necessary action.

### ■ Notice for the installer

	<b>WARNING</b>	This unit has to be installed by specialised technical personnel. The installation must be performed in accordance with the contents of this manual. If this unit is not properly installed, it will not realize its full performance potential and could cause injury or damage.
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This manual contains technical prescriptions, precautions and procedures to install the YOSHI AWS unit properly. It addresses to specialised technical personnel with a basic knowledge of gas heat pumps installation methods. Failure to observe the procedures herein indicated, could result in malfunction and damage to the unit. Before beginning the installation of the YOSHI AWS unit, read and fully understand the contents of this manual.

**After the installation, always call the local AISIN Authorised Service Centre  
to perform the outdoor and indoor units commissioning.**

Tecnocasa s.r.l. declines any responsibility for any damage whatever caused by improper use of the unit and/or non compliance with the information contained in this manual. Specifications, drawings and technical information in this manual are subject to change without notice.



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# 1 AWS unit specifications

All versions		AWS 8HP-E1 (E1J)	AWS 10HP-E1 (E1J)	AWS 13HP-E1 (E1J)	AWS 16HP-E1 (E1J)	AWS 20HP-E1 (E1J)	AWS 25HP-E1 (E1J)
Capacity code of the connected GHP outdoor unit	P224	P280	P355	P450	P560	P710	
Rated cooling capacity*	kW	21,0	26,5	33,5	41,0	52,0	63,5
Water temperature out - [in]	°C	7-[11]	7-[12]	7-[12]	7-[12]	7-[12]	7-[12]
Rated heating capacity **	kW	23,5	30,0	37,5	47,5	60,0	75,0
Water temperature out - [in]	°C	45,5-[41]	45,5-[40]	45,5-[40]	45,5-[40]	45,5-[40]	45,5-[40]
Flow rate	m <sup>3</sup> /h	4,5	4,5	6,0	7,5	9,5	12,0
Capacity modulation rate cooling (min-max)	kW	10,0-21,0	10,0-26,5	10,0-33,5	17,0-41,0	17,0-52,0	17,0-63,5
Capacity modulation rate heating (min-max)	kW	13,0-23,5	12,0-30,0	12,0-37,5	19,8-47,5	19,8-60,0	19,8-75,0
19.8-75.0	Power supply***	V/Ph/Hz		230/1/50			
	Power consumption	kW		0,84		1,1	
	Starting current	A			10		
	Available static pressure	kPa	80	80	60	100	80
Version without Pump (AWS E1J)	Power supply	V/Ph/Hz		230/1/50			
	Starting current	A			1,5		
Drop pressure plate heat exchanger	kPa	33	33	46	22	33	46
Water circuit	Water pipes connection	Inch		2			
	Primary circuit pipes diameter	Inch		2 or higher			
Refrigerant circuit	Refrigerant gas connection (gas – liquid)	mm	28,6-12,7		28,6-18,0		
	GHP – AWS pipes diameter (gas – liquid)	mm	19,1-9,5 **** (12,7)	22,2-9,5 **** (12,7)	25,4-12,7 **** (15,9)	28,6-12,7 **** (15,9)	28,6-15,88 **** (19,05)
External dimensions and weight	Height	mm	915				
	Width	mm	1020				
	Depth	mm	710				
With Pump/Without Pump	kg	164/153		204/177			
Connectable GHP outdoor units		Each AWS unit can be connected with a single AISIN GHP outdoor unit					

\* Rated cooling capacity is measured according to the following conditions: water outlet temperature 7°C; outdoor temperature 35°C DB

\*\* Rated heating capacity is measured according to the following conditions: water outlet temperature 47°C; outdoor temperature 7°C DB / 6°C WB

\*\*\* A version fitted with 230V, single phase, 60 Hz is available upon order.

\*\*\*\* If the distance between GHP and AWS exceeds 40 meters, install a pipe with the diameter indicated in brackets.

## 1.1 Installation prescriptions

	<b>CAUTION</b>	<b>Always foresee the installation of an emergency relief valve and a properly dimensioned expansion vessel. These devices are not built in the AWS unit. Where the storage tank should be installed lower than the AWS unit, foresee the installation of a jolly valve at the higher point of the water piping.</b> Failure to observe these prescriptions could result in malfunction and/or damage to the unit.
		<b>Always foresee the installation of a buffer tank, fitted with anti stratification pipes, which size should be adequate to the AWS unit capacity.</b> Failure to observe these prescription could result in malfunction and/or damage to the unit.
	<b>WARNING</b>	<b>Always check that the Y-shape water filter (supplied with the unit) is installed on the primary circuit return pipe. In case of multi units plants, install one filter each AWS unit. Install the filter to not less than 50 cm from suction of the pump.</b> Failure to observe this prescription makes the warranty no longer valid and could result in malfunction and/or damage to the unit.
		<b>Welding, refrigerant gas and water piping installation should be always performed by specialised technical personnel in accordance with instructions and prescriptions mentioned in the present manual.</b> Failure to observe this prescription makes the warranty no longer valid and could result in malfunction and/or damage to the YOSHI AWS unit.

## 2 Before installation

### 2.1 Parts provided

The following parts are provided with the YOSHI AWS unit.

	Name			
	Installation manual	Control box wiring diagram	2" Y-shape filter For water pipe [gaskets]	2" brass nipless [gaskets]
Quantity	1	1	1 - [2]	2 - [2]
Location	Inside the control panel		Inside the unit near the water connections	
Note	Always store the manuals in a dry and safe place		Refer to the prescriptions of this manual for the installation of the accessories	

### 2.2 Locally procured parts

The following items are required for installing the YOSHI AWS unit.

Part	Application
Anchor bolt	For installing the AWS unit on the ground (M8X4)
Washer, Nuts	For installing the AWS unit on the ground (φ8X4)
Ant vibrant carpet	For installing the unit on metal bars or on the roof.
Copper pipe and fittings for refrigerant gas	Refrigerant gas piping (materials and procedures are described in the GHP outdoor unit installation manual)
Steel pipe and fittings for water	Water piping (materials and procedures are described in the present manual)
Insulation	For refrigerant gas and water pipe insulation
Electrical wires	AWS unit power supply, ground wiring, communication and accessories wiring (proper size and wire specifications are described in the GHP outdoor unit installation manual)
R410a refrigerant gas, precision scale and gauge manifolds	Refrigerant circuit extra charge (refrigerant extra charge is described in the present manual)
Oxy acetylene welding kit	Gas bottles, nozzle and copper bars to weld refrigerant pipes
Nitrogen Bottle	Refrigerant gas leakage test (the procedure is described in the GHP outdoor unit installation manual)
Vacuum pump	Vacuum suction (the procedure is described in the GHP outdoor unit installation manual)
Pipe cutter	Refrigerant gas piping installation



#### WARNING



**Never use parts which are not compliant with those listed in the present manual.**

Failure to observe this prescription makes the warranty no longer valid and could result in malfunction and/or damage to the unit.



**The installation of the unit must comply with national and local codes.**

Failure to observe this prescription could result in illegal act.

**The manufacturer specifically disclaims any liability whatsoever for any claims by any party if any of the procedures in this Installation Manual have not been followed.** Failure to observe this prescription makes the warranty no longer valid.

## 3 Using a mixture of water and glycol

Use mixtures of water and antifreeze fluid to lower the freezing point of water. The liquid most commonly used as antifreeze is ethylene glycol. The table shows the reduction factors of the cooling capacity and the capacity of the pump of the AWS as a function of the water temperature and percentage by weight of glycol in the mixture.

Water °C	Glycol % kg	Reduction factor of the cooling capacity	Reduction factor of the pump flowrate
-2	5	0,995	0,99
-4	10	0,990	0,98
-6	15	0,985	0,96
-9	20	0,980	0,94
-12	25	0,975	0,92
-15	30	0,970	0,90
-19	35	0,965	0,88
-23	40	0,960	0,86
-29	45	0,955	0,83
-35	50	0,950	0,80

## 4 Installation

### 4.1 Selecting the location for installation

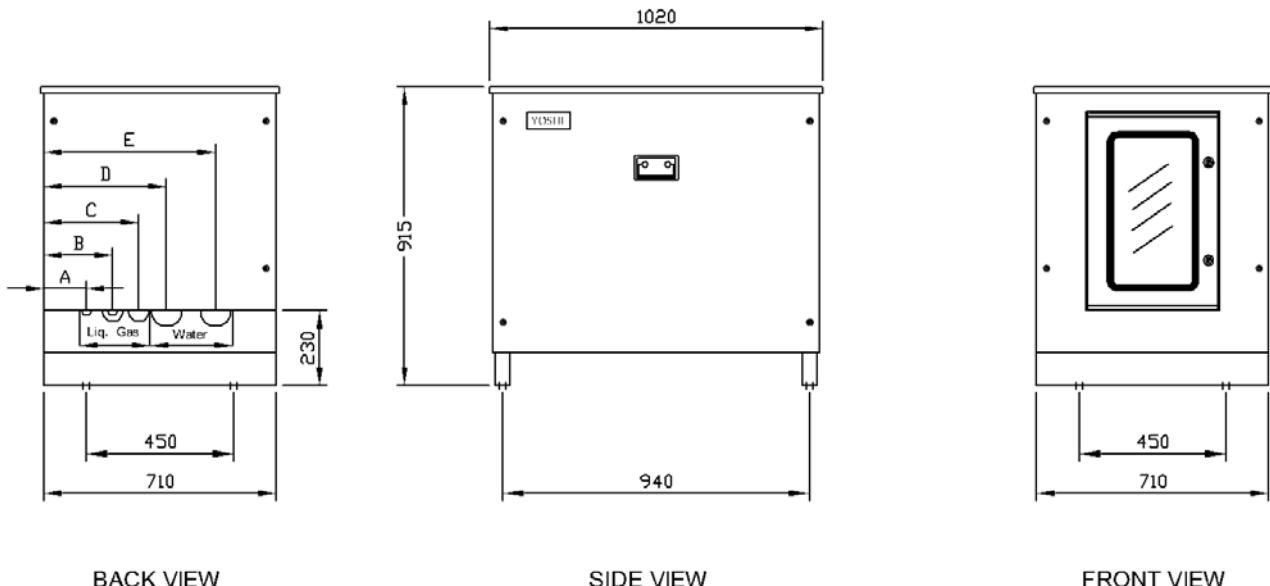
		 <b>WARNING</b>
	<ul style="list-style-type: none"><li>The unit <b>MUST NOT</b> be installed where <b>flammable gas is generated, accumulated or handled</b>. Failure to observe this prescription could result in damage of the unit, injury, fire or explosion.</li></ul>	
	<ul style="list-style-type: none"><li>The AWS unit is for outdoor and indoor installation. Read the present manual carefully to select a proper installation location. Make sure maintenance space is provided around the unit.</li><li>If the unit is installed at high location, provide a safe access by installing ladders or railings for the operator.</li></ul>	

- Always install the AWS unit in an area where its smooth operating noise and small vibration won't be a disturb for the neighbours, particularly in residential areas. Comply to local standards where prescribed.
- Always install the AWS unit in a level location where rainwater cannot accumulate. Provide proper drain routes.
- Always install the AWS unit in a location where it won't be exposed to strong winds. Provide proper anchor bolts.
- The AWS unit might cause slight interference with other electrical equipment, such as televisions, radios, computers and telephones. Provide proper clearances.
- If the AWS unit is installed in a region with heavy snowfall, install a snow protection hood. The base for the unit is high enough to avoid accumulation of snow in front of the body panels.
- Allocate the route for loading/unloading the unit, materials and parts for maintenance at the installation site.

## 4.2 External dimensions, hydraulic and refrigerant gas connections

The table below shows the diameters of the water connections, refrigerant, piping diameters and their position in the various models of AWS.

TECHNICAL DATA											
Water connections	Inch	φ2									
Water pipe connections	Inch	φ 2 or higher									
Refrigerant gas connections	mm	(8 – 10 – 13) HP					(16 – 20 – 25) HP				
		Liquid		Gas			Liquid		Gas		
Refrigerant pipes diameter	mm	12,7		28,6			18,0		28,6		
		8 HP		10 HP		13 HP		16 HP		20 HP	
		Liq.	Gas	Liq.	Gas	Liq.	Gas	Liq.	Gas	Liq.	Gas
		9,5	19,1	9,5	22,2	12,7	25,4	15,9	28,6	15,9	28,6
Hydraulic and refrigerant gas connection positions	Liquid	(16-20-25) HP		(8-10-13) HP							
	Gas			(16-20-25) HP		(8-10-13) HP					
	Water							(8-10-13-16-20-25) HP			
		A		B		C		D		E	
	mm	130		210		290		375		525	
Dimensions (W -H -D)	mm	710 -915 - 1020									



BACK VIEW

SIDE VIEW

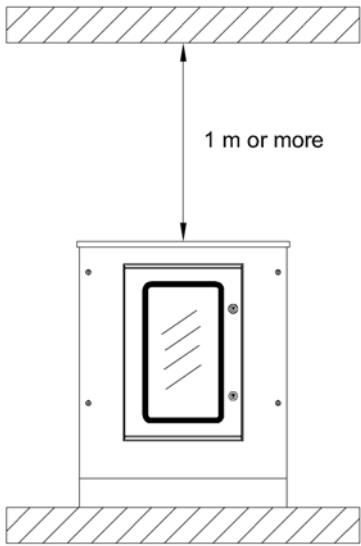
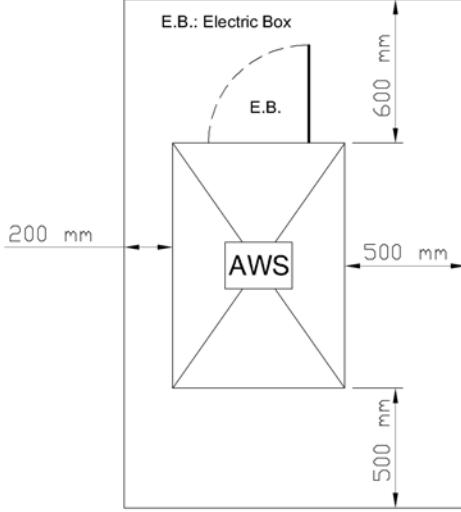
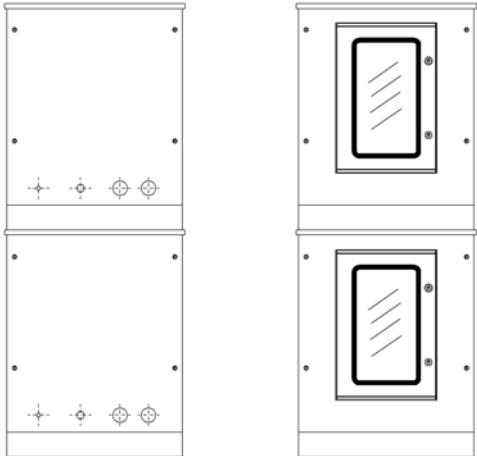
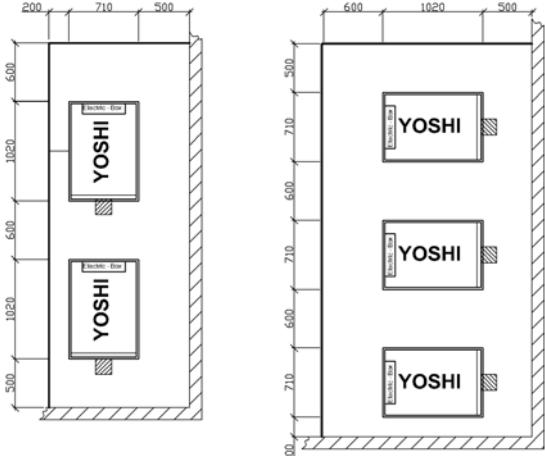
FRONT VIEW

## 4.3 Installation space

Clearances for maintenance and inspection operations are described in the tables below.

 <b>CAUTION</b>	
	<ul style="list-style-type: none"> <li><b>The minimum installation spaces are necessary to provide room for air circulation, inspection and maintenance of the AWS unit.</b> Failure to observe this prescription could result in injury to the maintenance personnel and damage to the unit.</li> <li><b>When more units are installed in the same location, make sure that nearby walls, pipes or other objects, are not obstructions for maintenance operations.</b> Maintenance space is described in the table below.</li> </ul>

Always provide ample space for inspecting and maintaining the piping for the refrigerant gas and for the water.

Front view	Top view
 <p>Always provide 1 m or more above the AWS unit</p>	<p><b>&lt;Single unit installation &gt;</b></p>  <p>Always leave at least 500 mm on the right side (viewed from coupling tubes AWS)</p>
<p><b>&lt;Overlapped multiple units installation&gt;</b></p>  <p>When the units are overlapped, route the pipes of the upper unit so that all the body panels of the lower unit can be disassembled.</p>	<p><b>&lt;Multiple units installation&gt;</b></p>  <p>Always leave at least 500 mm on the right side (viewed from coupling tubes AWS)</p>

## 5 Refrigerant pipes

### 5.1 Outline drawing of refrigerant piping.

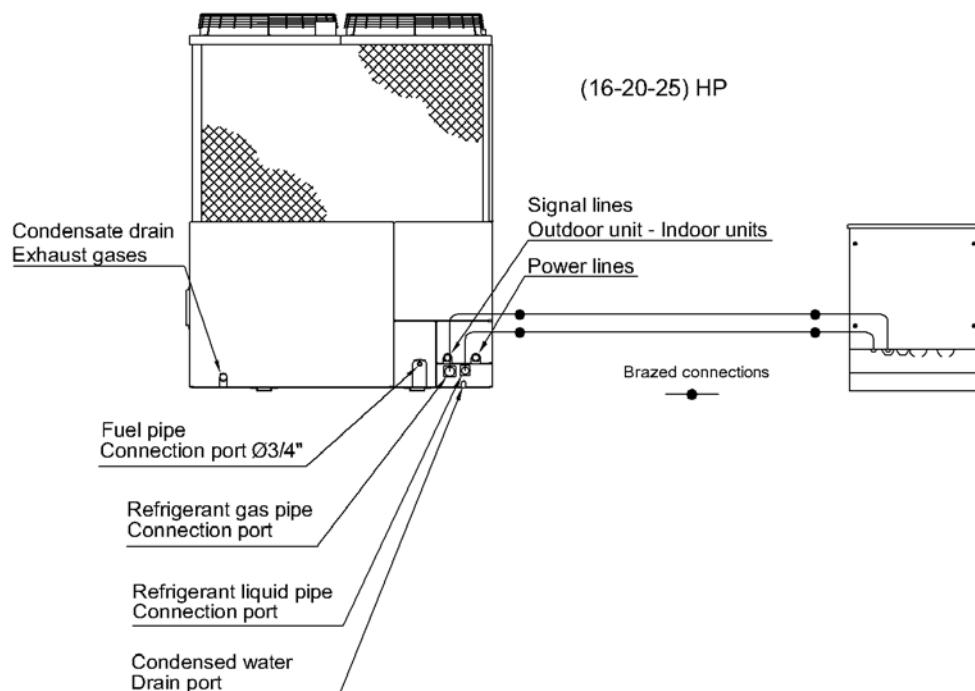
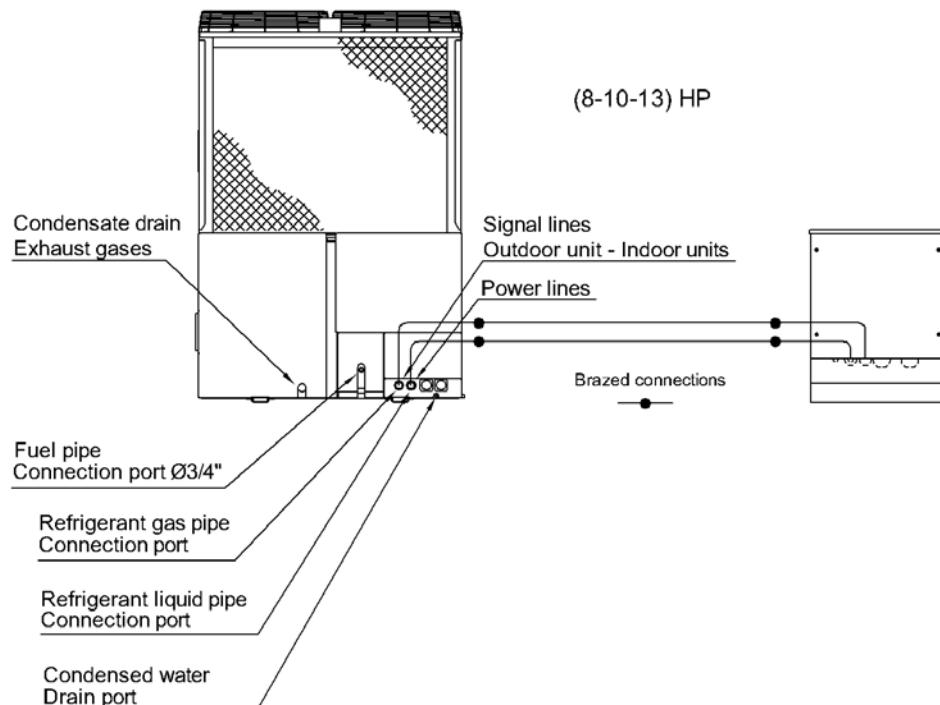


#### WARNING



All the welding operations on the AWS – GHP refrigerant gas piping must be always performed in accordance with instructions and prescriptions mentioned in the AISIN GHP installation manual (brazing with nitrogen flow).

Failure to observe this prescription makes the warranty no longer valid and could result in malfunction and/or damage to the YOSHI AWS unit.



## 5.2 Piping specifications

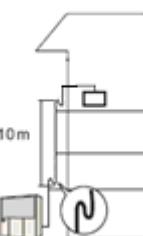
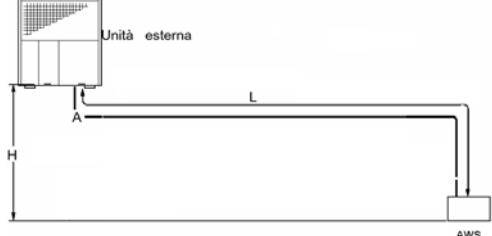
	<b>WARNING</b>
YOSHI AWS refrigerant gas connections diameter differs from the ones prescribed for the refrigerant gas line to the AISIN GHP outdoor unit. Therefore, install proper adapters (not supplied).	

Select the proper AWS – GHP pipe diameter according to the table below.

YOSHI AWS AISIN GHP Unit	Installation item						
	Diameter x Thickness (mm)			Acceptable piping length (m) (relative/actual)	Max. height difference(m)		Compressor oil
	Gas	Liquid	Liquid (*)		GHP ground	GHP roof	
GHP Multi Type AWS E1/E1J	[8 HP]	19,1x1,0	9,5x1,0	12,7x1,0	70/60	20	NL10
	[10 HP]	22,2x1,0	9,5x1,0	12,7x1,0			
	[13 HP]	25,4x1,0	12,7x1,0	15,9x1,0			
	[16 HP]	28,6x1,5	15,9x1,0	19,05x1,0			
	[20 HP]	28,6x1,5	15,9x1,0	19,05x1,0			
	[25 HP]	35,0x1,5	15,9x1,0	19,05x1,0			

(\*) If the distance between GHP and AWS exceeds 40 meters use a liquid tube of bigger diameter as indicated in the table.

The refrigerant gas line for the YOSHI AWS unit must be designed and installed in accordance with the prescriptions here under listed.

<p>Layout example (in case of AWS connection) If there is a height difference between the locations of indoor and outdoor units, be sure to apply "trap piping" on the vapour line within every 10 m as illustrated.</p> 			
Piping length	Maximum piping length (L) (Relative/Actual)	L = A	70/60m or less
Height difference	Height difference between indoor unit and outdoor unit (H)	When GHP outdoor unit is higher than AWS unit	25 m or less
		When GHP outdoor unit is lower than AWS unit	20 m or less

	<b>CAUTION</b>
<p>It is forbidden to connect direct expansion indoor units and YOSHI AWS to a single AISIN GHP outdoor unit simultaneously. The YOSHI AWS can be only connected to a specific AISIN GHP outdoor unit for AWS with the same capacity.</p>	

	<b>WARNING</b>
<ul style="list-style-type: none"> <li>Never exceed the maximum accepted distances when connecting the YOSHI AWS to the AISIN GHP outdoor unit. Failure to observe this prescription makes the warranty no longer valid and could result in malfunctioning of the YOSHI AWS unit.</li> </ul>	

### 5.3 Refrigerant gas extra charge



#### CAUTION



The refrigerant extra charge must be done in accordance with the procedures described in the AISIN GHP installation manual. Failure to observe this prescription makes the warranty no longer valid and could result in malfunctioning of the YOSHI AWS unit.



#### WARNING



**Accurately measure the length of the piping and charge with the proper amount of refrigerant gas.** Failure to observe this prescription could result in malfunctioning of the YOSHI AWS unit.  
**When charging the refrigerant gas, make sure to wear proper protective gloves.**  
Refrigerant gas leakages can cause frost bites.

- Always charge the refrigerant as a liquid in the tank. In case of charging as a gas may cause a compositional change of the refrigerant, and could result in a performance decline or a breakdown.
- Always use a refrigerant scale when charging the refrigerant. Using a charging cylinder may cause a compositional change of the refrigerant, could result in a performance decline or a breakdown.
- To avoid cross-contamination with other oil types, make sure to separate maintenance tools according to the type of refrigerant used. In particular, never use the gauge manifold and charging hose with other refrigerants than R410a.

After confirming the factory charge on the AISIN GHP label, use the following equation to determine the necessary extra amount of refrigerant gas. Always refer to the liquid pipe lengths and diameters only.

$$\text{Extra charge (kg)} = Q_{\text{AWS}} + (L1 \times 0.170) + (L2 \times 0.110) + (L3 \times 0.054)$$

L1: Liquid pipe Ø 15.9 total length (m)

L2: Liquid pipe Ø 12.7 total length (m)

L3: Liquid pipe Ø 9.52 total length (m)

The value of the variable parameter Q depends on the capacity of the AISIN GHP outdoor unit connected to the YOSHI AWS. Use the table below as reference.

Outdoor unit	Installation type	Q (kg)
8 – 10 – 13 HP	$Q_{\text{AWS}}$	0
16 – 20 – 25 HP	$Q_{\text{AWS}}$	+ 1,5

## 6 Refrigerant circuit and hydraulic circuit

### 6.1 Cooling mode

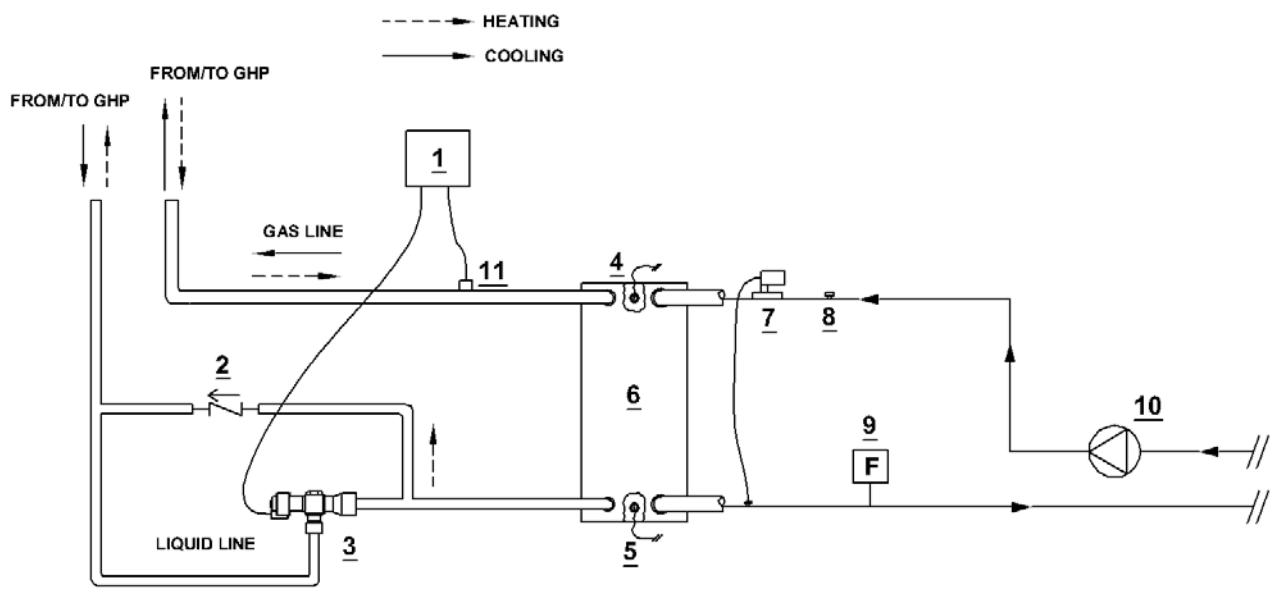
The refrigerant (R410A) processed by the GHP flows through electronic expansion valve and enters the lower part of the AWS unit heat exchanger at low pressure. The gas evaporates in the plate heat exchanger by taking heat from the counter current water flow. It goes back to the GHP as overheated steam. The outdoor unit fans create an air flow through the heat exchanger and thus the refrigerant can condense.

At the same time, the water coming from the buffer tank is cooled and pumped again into the primary circuit by the AWS built in pump. Flow switch, pressure switch and anti freeze thermo sensor overlook the water temperature never to drop inside the heat exchanger. In fact, water may freeze and the heat exchanger can be damaged.

### 6.2 Heating mode

The refrigerant (R410A) processed by the GHP enters the upper part of the AWS unit heat exchanger as high pressure overheated steam. The gas condenses in the plate heat exchanger by ceasing heat to the co current water flow. It goes back to the GHP as high pressure liquid, through the bypass pipe. The two outdoor unit expansion valves divide the return flow, reducing its pressure. The GHP manages the evaporation through the heat exchanger and the heat recovery.

At the same time, the water coming from the buffer tank is heated and pumped again into the primary circuit by the AWS built in pump.

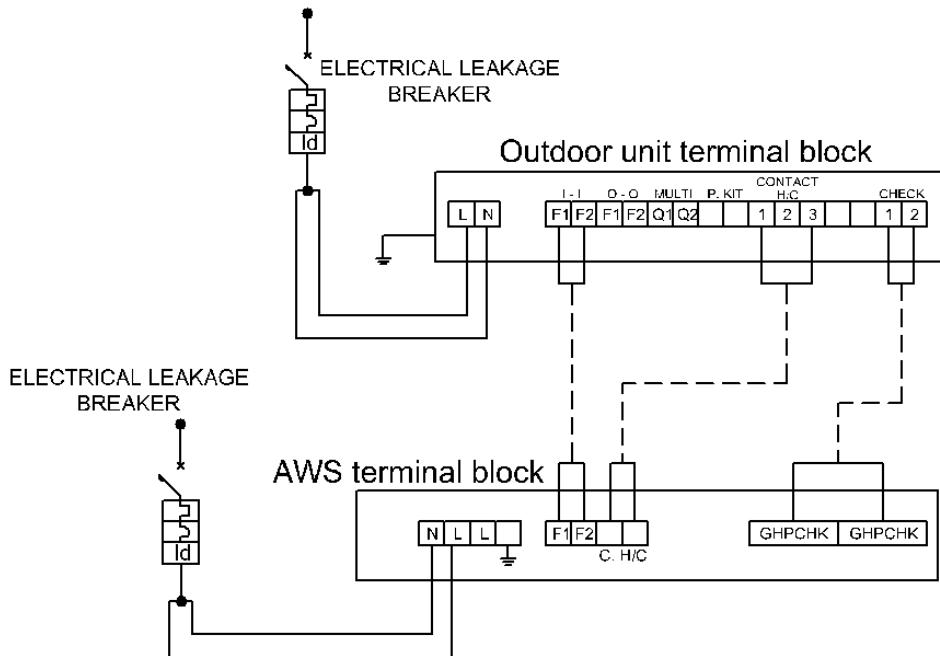
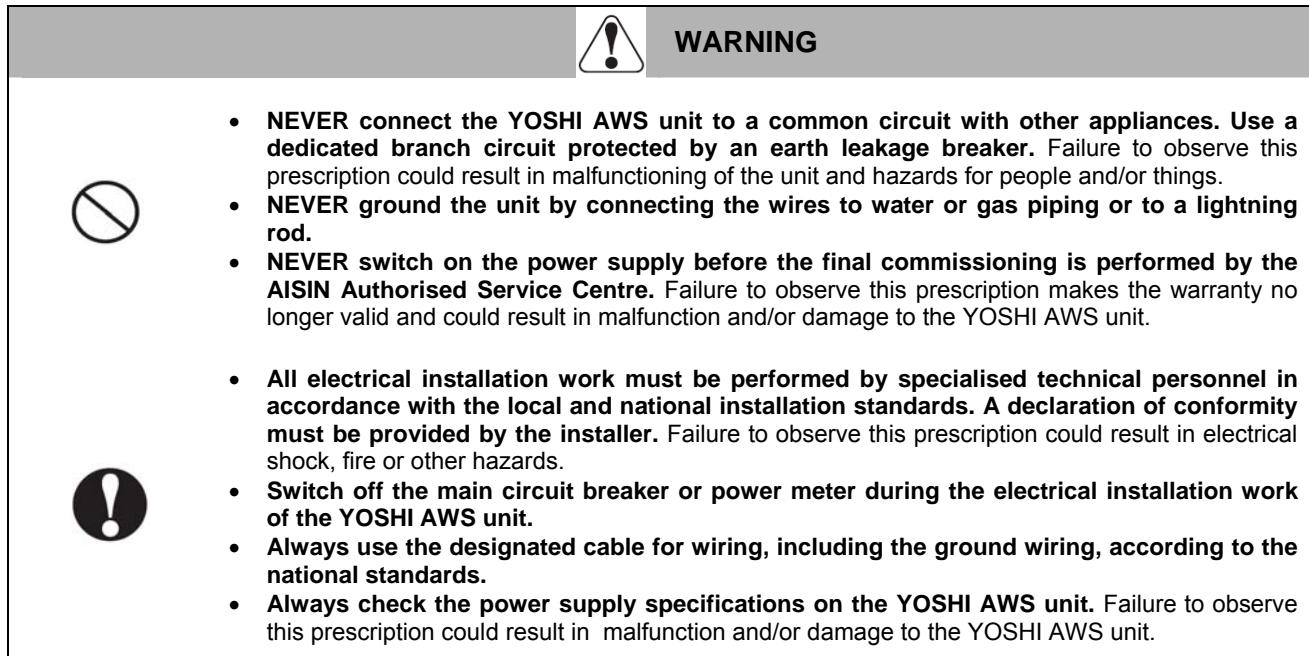


- 1) Driver expansion valve
- 2) Check valve
- 3) Electronic expansion valve
- 4) Water inlet temperature probe
- 5) Water outlet temperature probe
- 6) Plate heat exchanger
- 7) Water pressure difference switch
- 8) Air vent valve
- 9) Flow switch
- 10) Pump (not included in the version E1J)
- 11) Pressure switch expansion valve

## 7 Electric wire installation

### 7.1 Wiring with GHP outdoor unit

Power supply specifications are always mentioned on the YOSHI AWS product label. Always check the power supply before installing the unit. Always perform the wiring in accordance with the prescriptions listed in the paragraph 0 of the present manual.



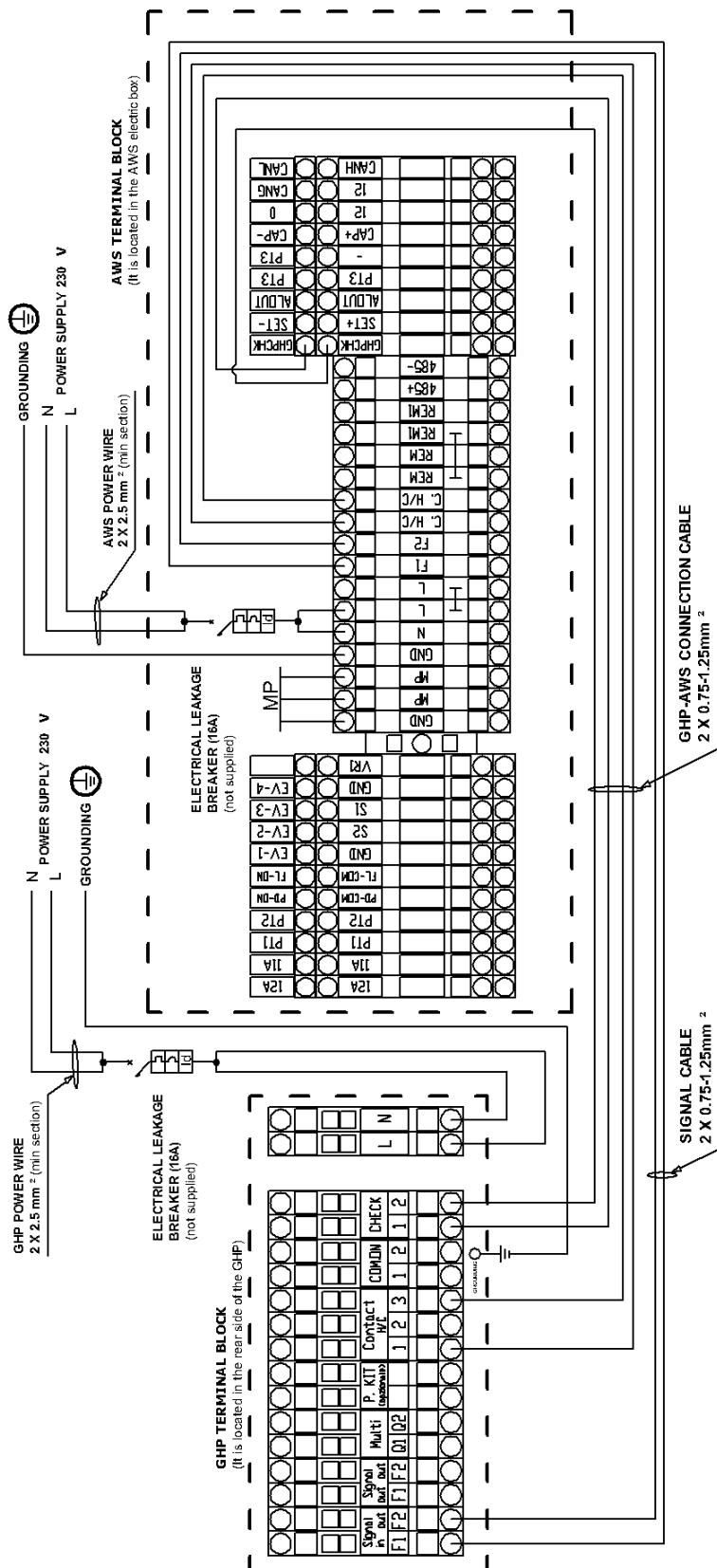
I – I: communication line outdoor unit – AWS.

O – O : communication line outdoor unit – outdoor unit (NOT AVAILABLE WITH AWS).

Q1 – Q2: electrical terminals present only on GHP (16-20-25) HP. Terminals can be used only for direct expansion.

**Never supply the unit with three phase power.**

## 7.2 Detailed wiring diagram



L-N: Power supply  
 CHECK: General alarm dry contact  
 CONTACT H/C: Heat/Cool selection signal  
 F1-F2: GHP AISIN - AWS YOSHI communication  
 Q1-Q2: Outdoor units communication. "Installation combined" Exp. direct. Only on GHP (16-20-25) HP  
 P. Kit: WKIT pump switch (optional)

MP: Power supply external pump or zone valve (only for AWS E1J version). Max 10 A contacts  
 REM: AWS remote ON/OFF selection  
 REM1: Heat/Cool remote selection  
 485+/485-: Modbus  
 GHPCHK: General alarm signal outdoor unit GHP  
 SET-/SET+ Segnale in corrente 4-20 mA DC per regolazione temperatura set point

ALOUT: General alarm signal outdoor unit (dry contact)  
 PT3: Outside temperature probe  
 CAP-/CAP+: Current signal power control 4-20 mA DC  
 0-12-12: Power supply control panel "controller plus" (12V)  
 CANH/CANL/CANG: Communication line panel "controller plus"

## 8 Accessories AWS

### 8.1 Controller Plus: Control Panel and Probe Temperature Buffer Tank

#### 8.1.1 Control panel

Control panel for the remote management of the AWS with which is possible to control and management of a single module from a remote location. The shielded cable connecting the panel to the module has a maximum length of 60 meters.

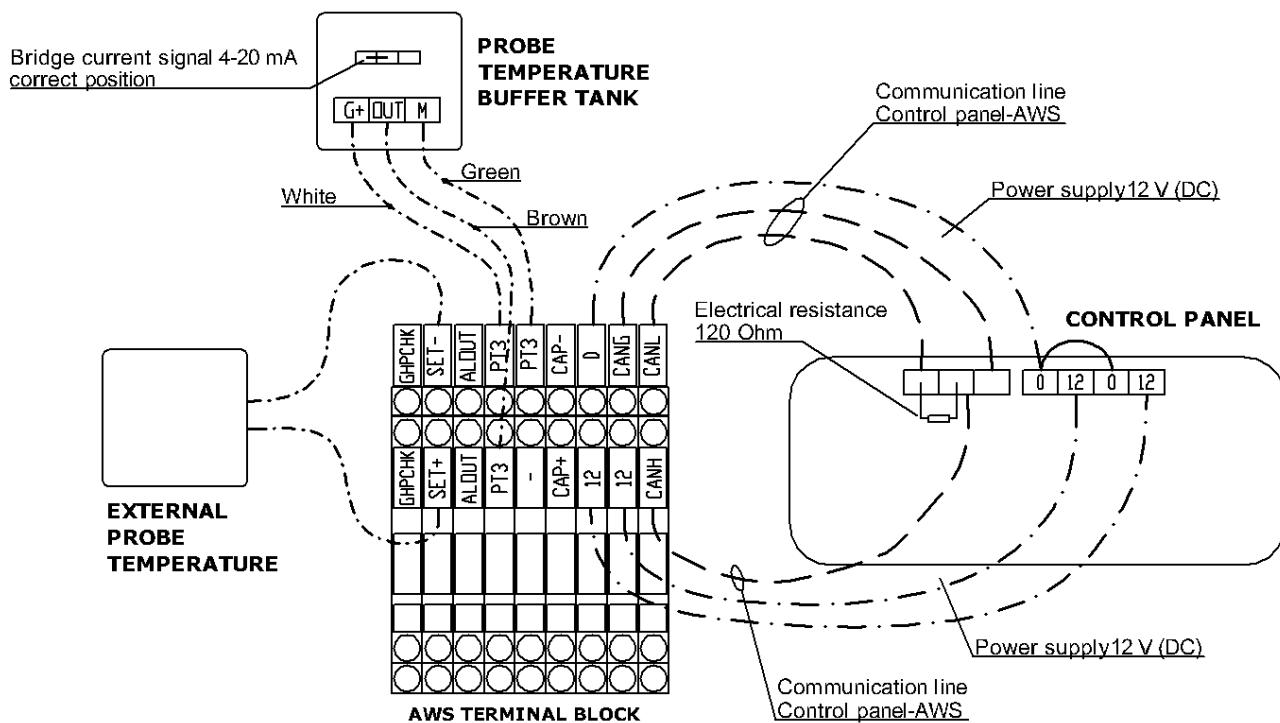
The panel allows you to control and modify the operating parameters of the module (for details regarding the management of the module with the remote control panel, refer to the AWS "service manual").

#### 8.1.2 Probe temperature buffer tank

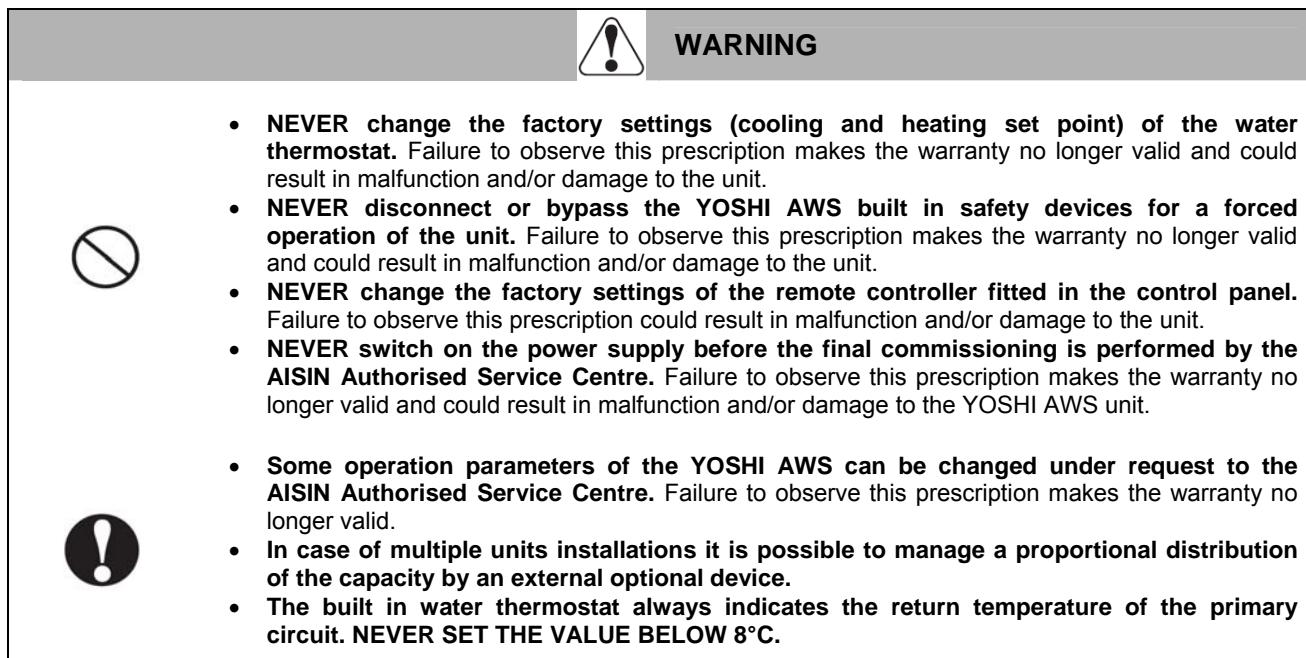
The probe is used to stop the pump when the AWS reaches the set point temperature. It must be installed on the tank and connected to the AWS as shown in the drawing.

### 8.2 External probe temperature

The probe allows adjustment of the flow temperature of the water according to the temperature of the outside air by means of a 4-20 mA current signal.

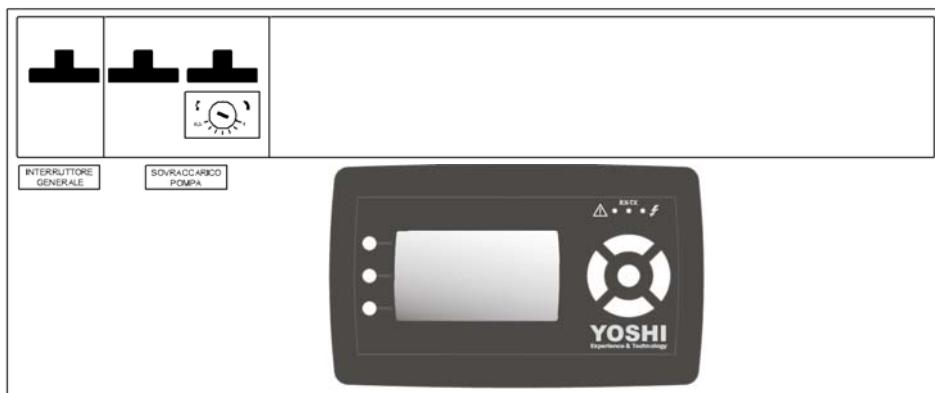


## 9 Control panel



The YOSHI AWS control panel is represented below.

In case of AISIN GHP outdoor unit malfunction, the error code will be displayed on the remote controller fitted in the YOSHI AWS control panel. Check the failure type on the AISIN GHP installation manual.



The water thermostat factory settings are:

- COOL mode: T set cool = 8°C
- HEAT mode: T set heat = 44°C

The YOSHI AWS has the following safety built in devices:

- **Pressure difference switch:** the AISIN GHP outdoor unit stops in case of missing pressure difference between inlet and outlet of the pump.
- **Flow switch:** the AISIN GHP outdoor unit stops in case of insufficient water flow in the primary circuit.
- **Antifreeze thermostat:** In the summer the AISIN GHP outdoor unit stops in case of water temperature in the primary circuit below +5°C. In the winter the pump is started when the water temperature is below +5 °C and, if necessary, also the GHP is started.
- **Pump overload switch:** the YOSHI AWS pump stops in case of overheating of the pump itself.

## 10 Adjustment AWS Set Point

### 10.1 Control panel

The unit AWS YOSHI has the possibility to vary the capacity delivered, in a range between 25% and 100% of rated power, as a function of the return water temperature on the primary circuit. The modulation of the capacity is adjusted according to a proportional band.

Just adjust the temperature set point on the user menu on the control panel, that is the parameters "Tset" and the proportional band width (Range modulation parameter). As the return water temperature on the primary approaches the set point, the AWS capacity is reduced of 25%. Once the set point is reached and exceed, the system makes 6 consecutive temperature checks, one every each 10 seconds. If, during these controls, the temperature never goes below the set point the AWS stops.

If the optional "Plus Controller" has been installed, once the set point has been reached and the AWS stops, the primary circulation pump halts. Otherwise, the primary circulation pump continues to run, nevertheless the AWS system is in stand-by.

Example of modulation in heating:

The set point temperature in heating, ie the parameter "Tset heat", may vary in a range between 30°C and 48°C.

The factory settings are:

Tset heat = 44°C;

Modulation Range = 5°C

The table below shows the method of variation of the capacity and a numerical example.

AWS Capacity [%]	Tset heat [°C]	Modulation Range [°C]	Low Temperature Modulation [°C]	Outlet Temperature [°C]
100	A	$\Delta T$	$A - \Delta T$	$A + 1$
75			$(A - \Delta T) + (\Delta T \cdot 0,25)$	
50			$(A - \Delta T) + (\Delta T \cdot 0,5)$	
25			$(A - \Delta T) + (\Delta T \cdot 0,75)$	
<b>Numerical example on the minimum temperature set point</b>				
100	30	5	25	31
75			26,25	
50			27,5	
25			28,75	
<b>Numerical example on the maximum temperature set point</b>				
100	48	7	41	49
75			42,75	
50			44,5	
25			46,25	

Example modulation in cooling:

The set point temperature in cooling, ie the parameter "Tset cool", may vary in a range between 6°C and 15°C.

The factory settings are:

Tset cool= 8°C;

Modulation Range = 5°C

AWS Capacity [%]	Tset cool [°C]	Modulation Range [°C]	Max. Temperature Modulation [°C]	Outlet Temperature [°C]
100	A	$\Delta T$	$A + \Delta T$	A - 1
75			$(A + \Delta T) - (\Delta T \cdot 0,25)$	
50			$(A + \Delta T) - (\Delta T \cdot 0,5)$	
25			$(A + \Delta T) - (\Delta T \cdot 0,75)$	
<b>Numerical example on the minimum temperature set point</b>				
100	6	5	11	5
75			9,75	
50			8,5	
25			7,25	
<b>Numerical example on the maximum temperature set point</b>				
100	15	7	22	14
75			20,25	
50			18,5	
25			16,75	

## 10.2 Setting the offset

The unit YOSHI AWS allows you to adjust the offset of the set point temperature, that is the return water temperature on the primary circuit. The parameters "Tset Offset" can be changed in the user menu, (please refer to the AWS service manual). If the optional "Controller Plus" has been installed, of the offset measurement will be made by its active probe, installed on the buffer tank.

The factory settings are:

Heat Tset Offset = 2°C

Cool Tset Offset = 2°C

## 11 Installation layouts

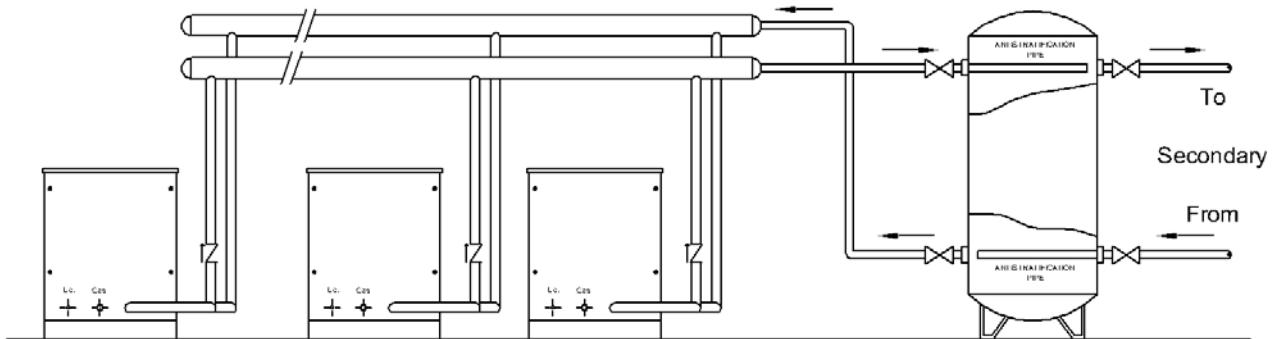


### CAUTION

The installation layouts below are just representative of suggested possibilities. Always refer to technical qualified personnel for designing. Further information is available under request by AISIN technical department or on the website [www.aisin.it](http://www.aisin.it).

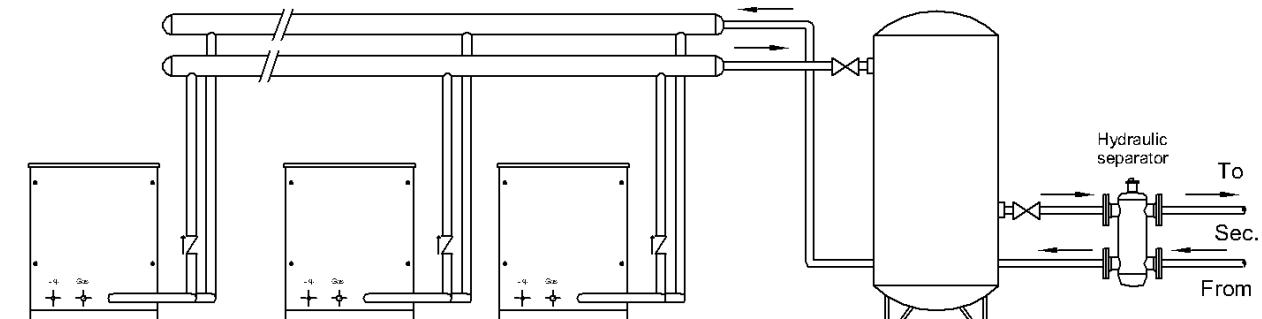
### 11.1 Central storage tank installation

This layout is recommended by the manufacturer for fan-coil installations. to optimise the operation of the AISIN GHP. When choosing this layout always make sure that the water flow of the primary and the secondary circuits are balanced. Moreover, the storage tank must be provided with anti stratification pipes.



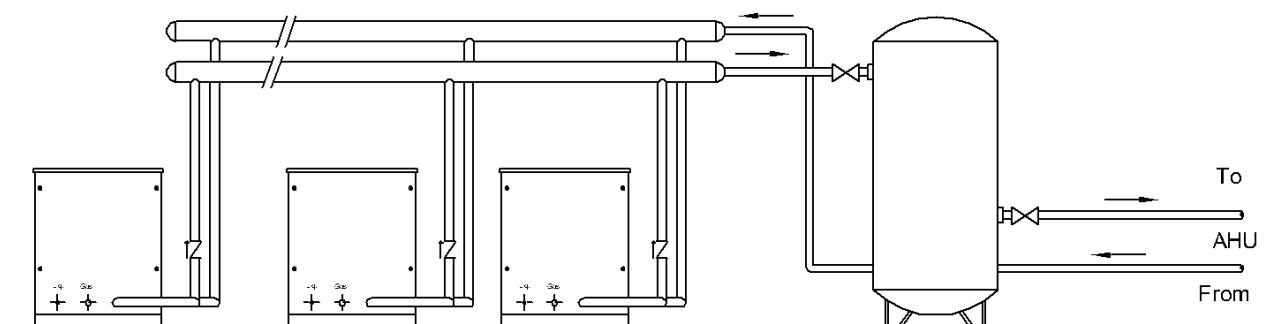
### 11.2 Hydraulic separator installation

When choosing this layout, make sure that the static pressure of the water pump fitted in the YOSHI AWS unit is enough to win the total pressure drop of the primary circuit. In this case it is possible to install horizontal storage tanks.

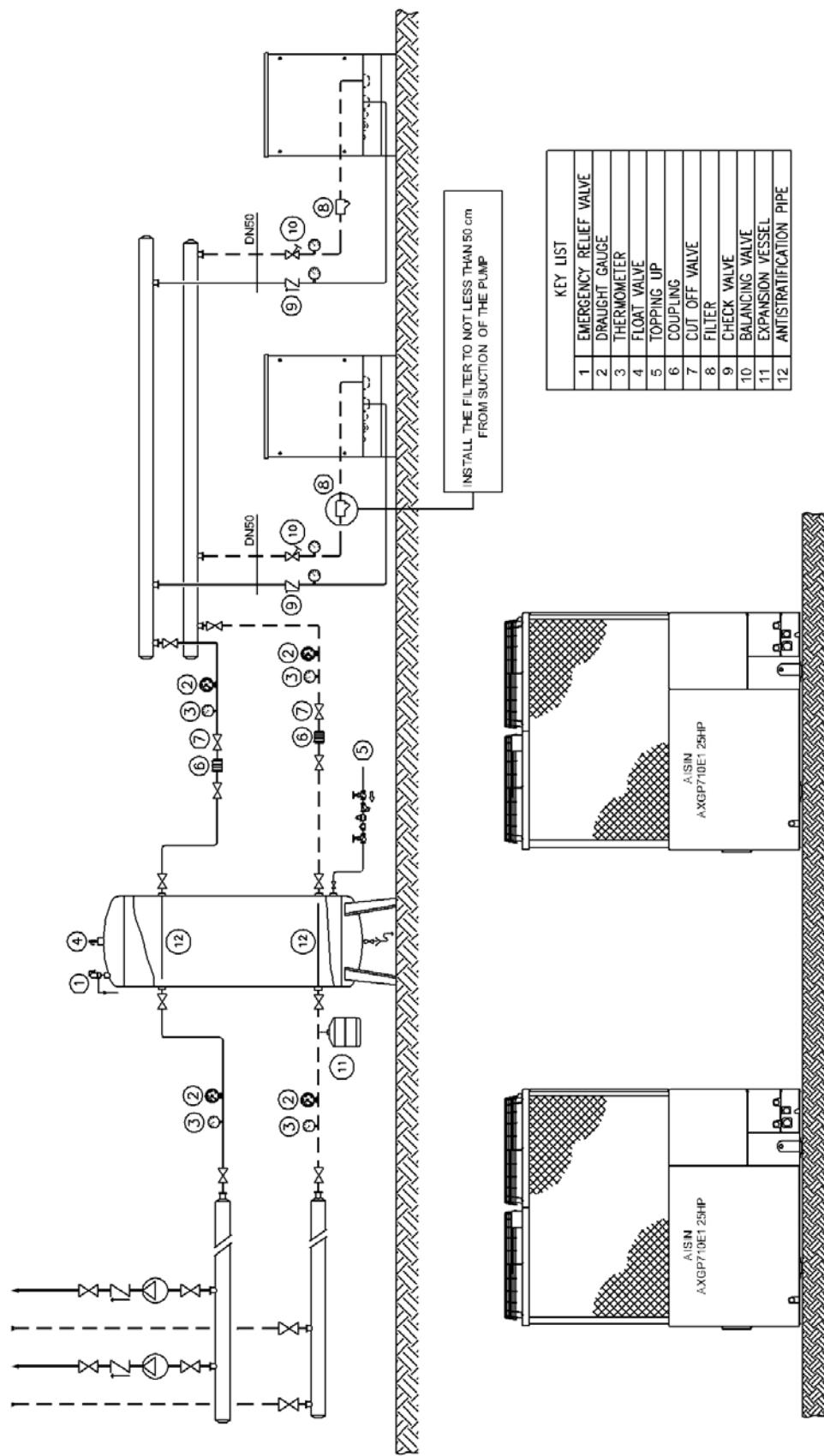


### 11.3 Single pump installation

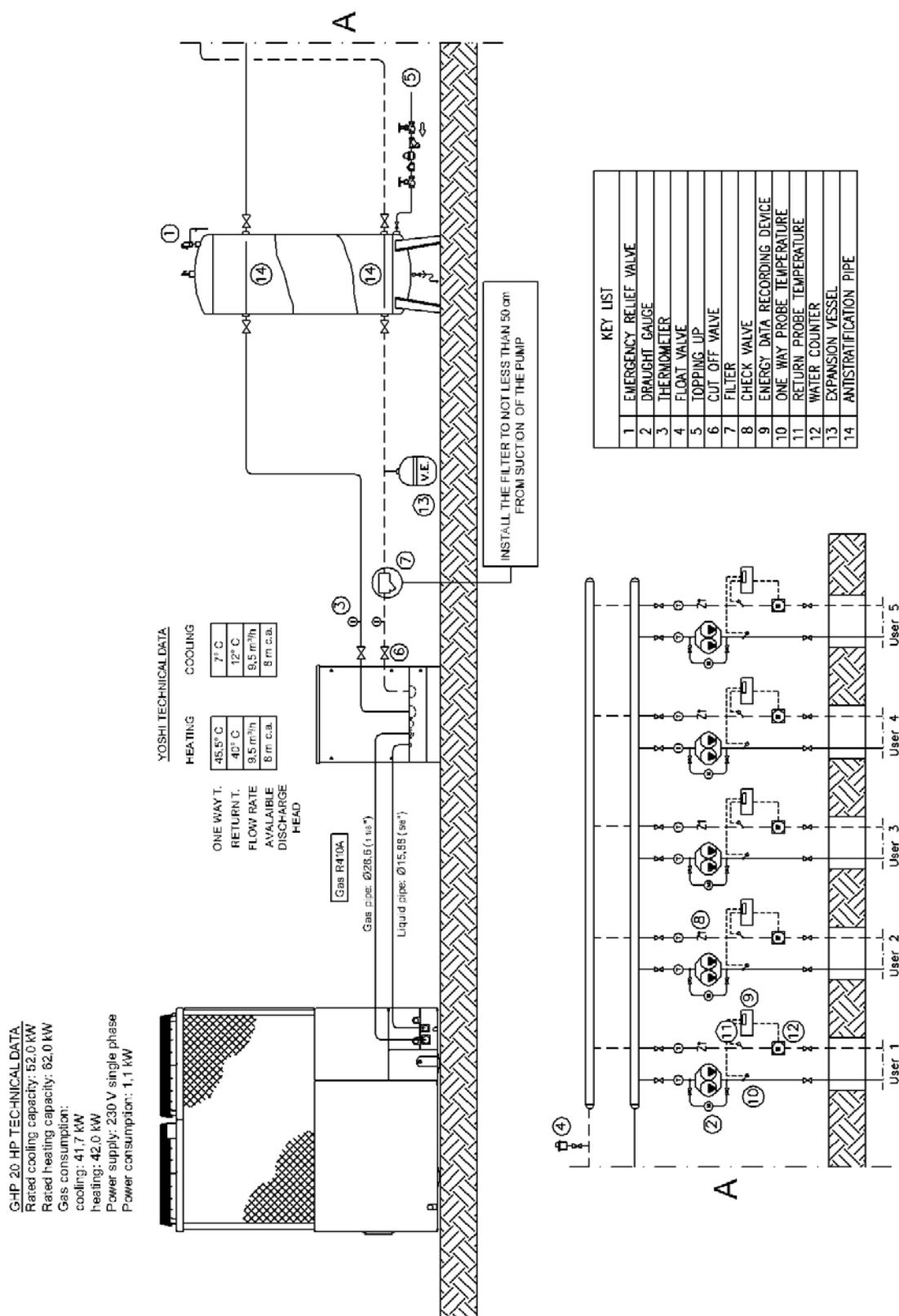
This layout is recommended by the manufacturer for Air Handling Unit (AHU) installations. Make sure that the static pressure of the water pump fitted in the YOSHI AWS unit is enough to win the total pressure drop of the whole circuit.



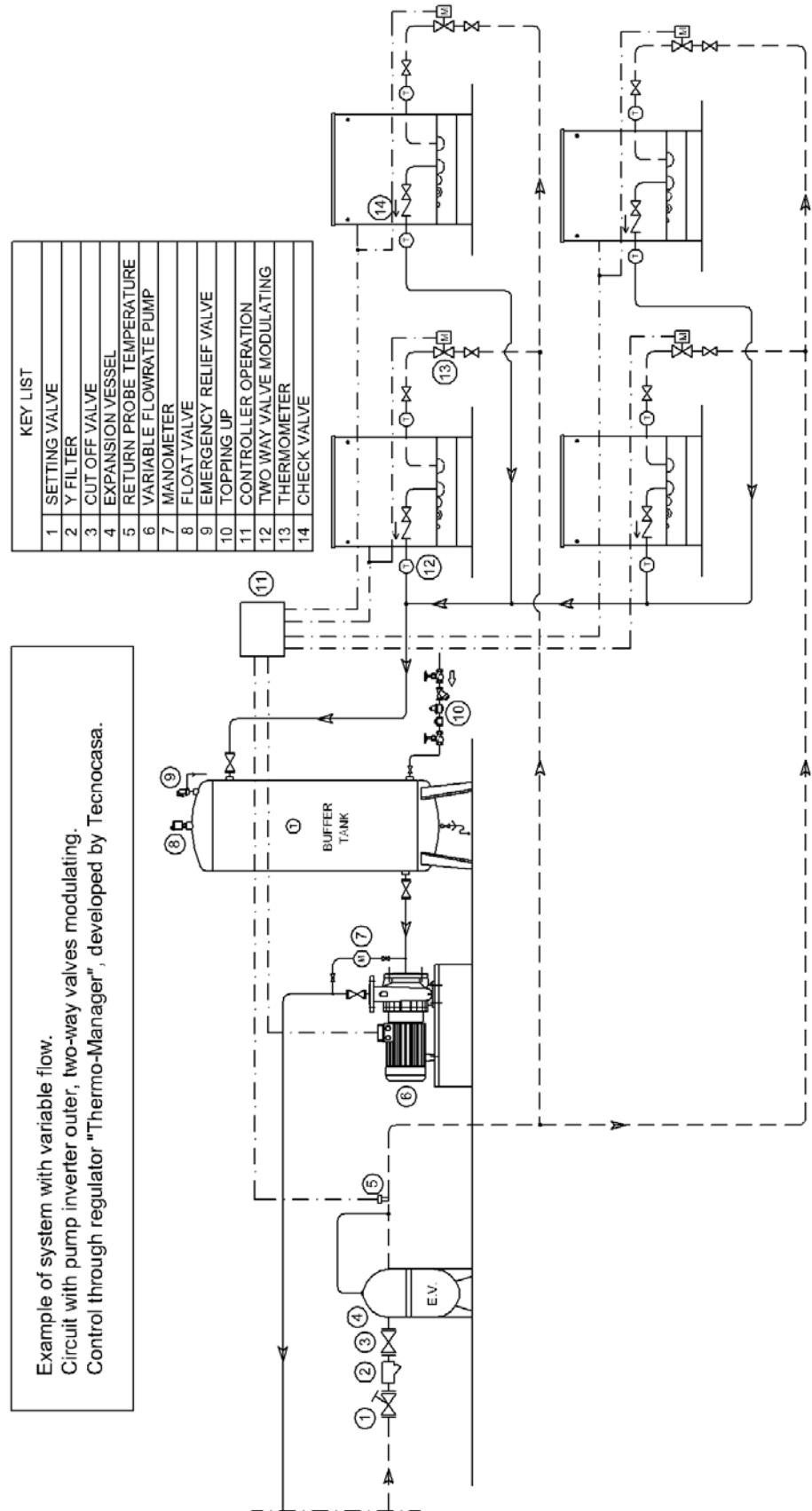
## 11.4 HVAC installation layout AWS E1 (Internal Pump)



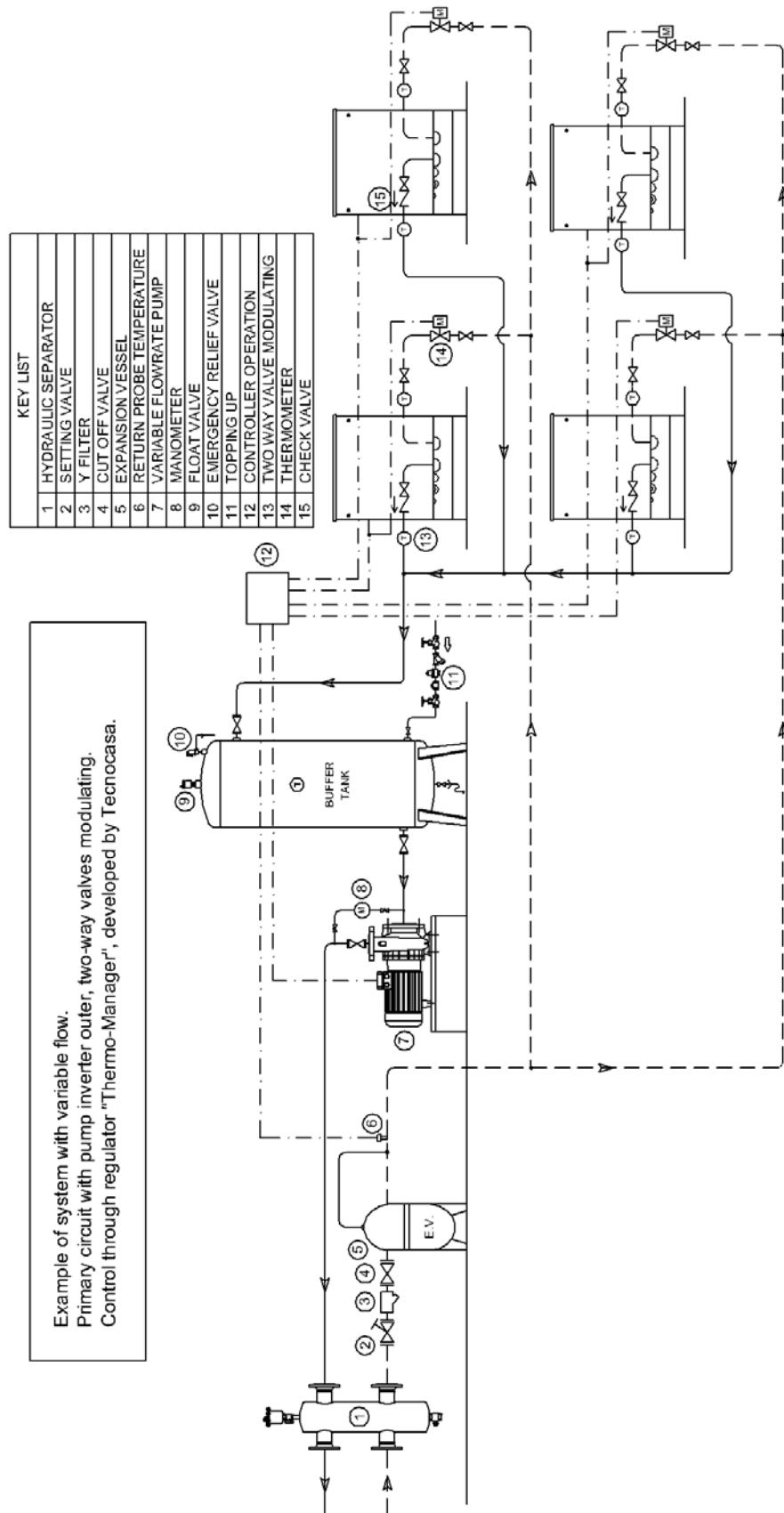
## 11.5 HVAC installation with proportional distribution of consumption



## 11.6 HVAC installation with Pump External variable flow rate



## 11.7 HVAC installation a variable flow rate



## 12 Trouble diagnosis (reference)

 <b>WARNING</b>	
	<ul style="list-style-type: none"> <li>• <b>NEVER stop the GHP – AWS system by switching off the power supply during the operation.</b> Failure to observe this prescription makes the warranty no longer valid and could result in malfunction and/or damage to the unit.</li> <li>• <b>NEVER switch on the YOSHI AWS power supply after switching on the GHP outdoor unit.</b> Failure to observe this prescription could result in malfunction and/or damage to the unit.</li> </ul>

The table below shows all the possible failures indicated directly by the YOSHI AWS control panel.

ALARM TYPE	ALARM CODE	POSSIBLE CAUSES	SOLUTIONS
Flow switch alarm	<b>A1S1</b>	<ul style="list-style-type: none"> <li>• Y-filter clogged</li> <li>• Capacity insufficient</li> </ul>	<ul style="list-style-type: none"> <li>• Clean the Y-filter</li> <li>• Check the pressure in the hydraulic circuit</li> <li>• Check the flow switch</li> </ul>
Pressure difference switch alarm	<b>A2S1</b>	<ul style="list-style-type: none"> <li>• Air in the system</li> <li>• Pump malfunction</li> </ul>	<ul style="list-style-type: none"> <li>• Remove the air</li> <li>• Replace the pump</li> <li>• Check the pressure differential switch (compare the state with the flow switch)</li> </ul>
GHP Alarm	<b>A3S1</b>		<ul style="list-style-type: none"> <li>• Check the code displayed on the GHP. Press UP for the current alarms and DOWN for those in STAN-BY</li> </ul>
Flowswitch tamper alarm	<b>A4S1</b>		<ul style="list-style-type: none"> <li>• Check the wiring of the flowswitch.</li> <li>• Check the operation of the flowswitch.</li> <li>• Check the layout of plant (other pumps make circulate water when not expected)</li> </ul>
Antifreeze alarm	<b>A5S1</b>		<ul style="list-style-type: none"> <li>• Check the operation of the pump, the flow switch and pressure differential switch</li> <li>• Verify that the offset values in summer operation are not excessive</li> <li>• Check the temperature probes and their wiring</li> </ul>
Return temperature probe alarm	<b>A6S1</b>		<ul style="list-style-type: none"> <li>• Check the probe and the wiring</li> </ul>
Antifreeze temperature probe alarm	<b>A7S1</b>		<ul style="list-style-type: none"> <li>• Check the probe and the wiring</li> </ul>
Expansion valve driver alarm	<b>A8S1</b>		<ul style="list-style-type: none"> <li>• Use the Carel display. Press "help" and check which component is in alarm</li> </ul>
Maintenance period warning		The heat pump is about to reach the 10.000 hours of operation. Need for routine maintenance.	<ul style="list-style-type: none"> <li>• Contact the service centre Aisin</li> </ul>
Maintenance period alarm		The heat pump has reached 10.000 hours of operation. Need for routine maintenance.	<ul style="list-style-type: none"> <li>• Reset the hours of operation (See page 82, paragraph 13.3 "Reset hours of operation".)</li> </ul>

The table below shows all the error codes displayed on the remote controller fitted in the AWS control panel. In case of malfunction contact the AISIN Authorised Service Centre that usually maintains the GHP outdoor unit.

R/C AWS	Blinking indication (ON doesn't blink) (OFF led off)			GHP outdoor unit display	Type of failure	Possible cause
Error code	Led ON/OFF	TEST Disp.	Unit No.			
A0	X	X	X	63-n	External input	<ul style="list-style-type: none"> <li>External protection input signal stops the unit</li> <li>Remote controller local setting failure</li> </ul>
A1	X	X	X	20-n	Indoor unit PC board	<ul style="list-style-type: none"> <li>PC board defective</li> <li>EEPROM setting error</li> </ul>
A3	X	X	X	95-n	Drain lines - AWS flow switch	<ul style="list-style-type: none"> <li>Direct Expansion version – indoor unit drain pump malfunction.</li> <li>AWS version – flow switch or antifreeze thermostat switched off.</li> </ul>
A6	X	X	X	15-n	Indoor unit fan motor	<ul style="list-style-type: none"> <li>Fan motor blocked</li> <li>Harness disconnection</li> </ul>
A7	ON	X	X	35-n	Indoor unit swing flap motor	<ul style="list-style-type: none"> <li>Swing flap motor malfunction</li> <li>Cam mechanism failure</li> </ul>
A9	X	X	X	21-n	Indoor unit PC board	<ul style="list-style-type: none"> <li>LEV malfunction</li> <li>Harness disconnection</li> </ul>
AF	ON	OFF	X	30-n	Drain pipe	<ul style="list-style-type: none"> <li>Improper drain piping installation (inverse draft)</li> <li>Pipe clogged</li> </ul>
AH	ON	OFF	X	31-n	Air cleaning device	<ul style="list-style-type: none"> <li>Indoor unit circuit board malfunction</li> <li>Air cleaning device failure (optional)</li> </ul>
AJ	X	X	X	22-n	Capacity setting	<ul style="list-style-type: none"> <li>Capacity setting failure</li> <li>Missing capacity setting adapter (replacement of PCB)</li> </ul>
C4	X	X	X	18-n	Indoor unit temperature sensors	<ul style="list-style-type: none"> <li>Heat exchanger temperature sensor failure</li> <li>Improper harness connection</li> </ul>
C5	X	X	X	19-n		<ul style="list-style-type: none"> <li>Gas pipe temperature sensor failure</li> <li>Improper harness connection</li> </ul>
C9	X	X	X	97-n		<ul style="list-style-type: none"> <li>Direct Expansion version - Intake air temperature sensor failure</li> <li>AWS version – Resistors group failure</li> <li>Improper harness connection</li> </ul>
CA	X	X	X	98-n		<ul style="list-style-type: none"> <li>Exhaust air temperature sensor failure</li> <li>Improper harness connection</li> </ul>
CJ	ON	OFF	X	17-n		<ul style="list-style-type: none"> <li>R/C temperature sensor failure</li> <li>Improper harness connection</li> </ul>
U3	X	X	X	-	Test run	<ul style="list-style-type: none"> <li>Test run operation</li> </ul>
U4	X	X	X	-	Communication	<ul style="list-style-type: none"> <li>Outdoor unit power supply OFF</li> <li>Outdoor unit – indoor unit transmission error</li> </ul>
U5	X	X	X	1-n	Communication	<ul style="list-style-type: none"> <li>Duplicating main remote controller connection</li> <li>Transmission error</li> </ul>
	OFF	ON	OFF	-	Remote controller PC board	<ul style="list-style-type: none"> <li>Remote controller PC board failure</li> <li>Remote controller setting failure</li> </ul>
U8	X	X	OFF	-		<ul style="list-style-type: none"> <li>Transmission error between main and sub remote controller</li> </ul>
U9	X	X	X	-		<ul style="list-style-type: none"> <li>Transmission error between two indoor units</li> <li>Transmission error between outdoor and indoor unit</li> </ul>
UC	ON	ON	ON	36-n	Central remote controller	<ul style="list-style-type: none"> <li>Address duplication of central remote controller</li> <li>Air-net address duplication of indoor units</li> </ul>
UE	X	X	X	23-n		<ul style="list-style-type: none"> <li>Transmission error between indoor unit and central remote controller</li> </ul>
UF	X	X	X	24-n		<ul style="list-style-type: none"> <li>Communication error between indoor and outdoor unit</li> <li>Improper wiring</li> </ul>
UH	X	X	X	-	Communication	<ul style="list-style-type: none"> <li>Indoor unit address setting failure</li> </ul>
E1	X	X	X	40-0~2		<ul style="list-style-type: none"> <li>EEPROM failure or program failure</li> </ul>
	X	X	X	84-3,4		<ul style="list-style-type: none"> <li>Outdoor unit PC board malfunction</li> <li>Transmission error between microcomputer</li> </ul>
E3	X	X	X	86-0	Operation failure	<ul style="list-style-type: none"> <li>Refrigerant High pressure alarm</li> </ul>
E4	X	X	X	88-0		<ul style="list-style-type: none"> <li>Refrigerant Low pressure alarm</li> </ul>
E7	X	OFF	X	86-10~23	Outdoor unit fan	<ul style="list-style-type: none"> <li>Heat exchanger fan (1,2,3) failure</li> <li>DCBL board failure</li> </ul>
EA	X	X	X	57-0	4-way valve	<ul style="list-style-type: none"> <li>4-way valve failure</li> <li>Harness disconnection</li> </ul>
EC	X	X	X	80-0	Operation failure	<ul style="list-style-type: none"> <li>Engine coolant overheating (temperature &gt;105°C)</li> </ul>

EH	X	X	X	80-10~30	Engine coolant pump	<ul style="list-style-type: none"> <li>Engine coolant pump failure</li> <li>DCBL board failure</li> </ul>
R/C AWS	<b>Blinking indication (ON doesn't blink) (OFF led off)</b>			GHP outdoor unit display	Type of failure Error code	<b>Possible cause</b>
Error code	Led ON/OFF	TEST Disp.	Unit No.			
F3	X	X	X	91-0	Operation failure	<ul style="list-style-type: none"> <li>Compressor discharge temperature too high (&gt;120°C)</li> <li>Compressor intake temperature too high (&gt; 40°C)</li> </ul>
F4	X	X	X	87-0,2		<ul style="list-style-type: none"> <li>Abnormal engine oil pressure</li> <li>Engine oil level insufficient</li> </ul>
FE	X	X	X	81-0	Engine oil	<ul style="list-style-type: none"> <li>Refrigerant oil supply valve failure</li> <li>Improper harness connection</li> </ul>
FF	X	X	X	58-0	Compressor oil	<ul style="list-style-type: none"> <li>Catalyser overheating (where provided)</li> </ul>
FJ	X	X	X	47-0	Catalyser	<ul style="list-style-type: none"> <li>High pressure switch malfunction</li> <li>Improper harness connection</li> </ul>
H3	X	X	X	76-0	High pressure switch	<ul style="list-style-type: none"> <li>Low pressure switch malfunction</li> <li>Improper harness connection</li> </ul>
H4	X	X	X	88-2	Low pressure switch	<ul style="list-style-type: none"> <li>Outdoor temperature sensor malfunction</li> <li>Improper harness connection</li> </ul>
H9	X	X	X	61-0	Outdoor unit temperature sensors	<ul style="list-style-type: none"> <li>Outdoor temperature sensor short circuit</li> </ul>
H9	X	X	X	61-1		<ul style="list-style-type: none"> <li>Engine coolant temperature sensor malfunction</li> <li>Improper harness connection</li> </ul>
HC	X	X	X	70-0		<ul style="list-style-type: none"> <li>Engine coolant temperature sensor short circuit</li> </ul>
HC	X	X	X	80-1		<ul style="list-style-type: none"> <li>Engine coolant level insufficient</li> </ul>
HJ	X	X	X	80-2		<ul style="list-style-type: none"> <li>Periodic maintenance alert</li> </ul>
HF	X	OFF	X	EE-0		<ul style="list-style-type: none"> <li>Compressor discharge temp sensor disconnected</li> <li>Compressor discharge temp sensor short circuit</li> </ul>
J3	X	X	X	78-1~5	Outdoor unit temperature sensors	<ul style="list-style-type: none"> <li>Super cooling heat ex. temp. sensor disconnected</li> <li>Super cooling heat ex. temp. sensor short circuit</li> </ul>
	X	X	X	91-2-7		<ul style="list-style-type: none"> <li>Accumulator outlet temp. sensor disconnected</li> <li>Accumulator outlet temp. sensor short circuit</li> </ul>
J4	X	X	X	54-0		<ul style="list-style-type: none"> <li>Compressor intake temp. sensor disconnected</li> <li>Compressor intake temp. sensor short circuit</li> </ul>
	X	X	X	54-1		<ul style="list-style-type: none"> <li>Heat exchanger liquid pipe temp. sensor disconnected</li> <li>Improper harness connection</li> </ul>
	X	X	X	55-0,1		<ul style="list-style-type: none"> <li>Heat exchanger liquid pipe temp. sensor short circuit</li> </ul>
	X	X	X	55-2,3		<ul style="list-style-type: none"> <li>Sub heat exchanger liquid pipe temp. sensor disconnected</li> </ul>
J5	X	X	X	53-0,1		<ul style="list-style-type: none"> <li>Sub heat exchanger liquid pipe temp. sensor short circuit</li> </ul>
	X	X	X	53-2,3		<ul style="list-style-type: none"> <li>Outdoor liquid pipe temp. sensor disconnected</li> <li>Outdoor liquid pipe temp. sensor short circuit</li> </ul>
J6	X	X	X	65-0		<ul style="list-style-type: none"> <li>High pressure sensor malfunction</li> <li>Low pressure sensor malfunction</li> </ul>
	X	X	X	65-2		<ul style="list-style-type: none"> <li>Oil pressure switch disconnected</li> </ul>
J7	X	X	X	66-0	Outdoor unit temperature sensors	<ul style="list-style-type: none"> <li>Engine room temp. sensor disconnected</li> <li>Engine room temp. sensor short circuit</li> </ul>
	X	X	X	66-1		<ul style="list-style-type: none"> <li>Catalyser temp. sensor disconnected</li> </ul>
J8	X	X	X	67-0		<ul style="list-style-type: none"> <li>Igniter voltage too low or too high</li> </ul>
	X	X	X	67-2		<ul style="list-style-type: none"> <li>Engine start failure – missing supply gas</li> <li>Unwanted engine stop</li> </ul>
JA	X	X	X	73-0,1	Oil pressure sw.	<ul style="list-style-type: none"> <li>Insufficient starting engine speed (starter failure)</li> <li>Abnormal engine speed (gas mixer failure)</li> </ul>
JC	X	X	X	88-4		<ul style="list-style-type: none"> <li>Supply electro magnetic gas valves failure</li> </ul>
JE	X	X	X	71-0	Outdoor unit temperature sensors	<ul style="list-style-type: none"> <li>Starter failure</li> </ul>
JJ	X	X	X	72-0		<ul style="list-style-type: none"> <li>Refrigerant gas empty</li> </ul>
	X	X	X	72-1		<ul style="list-style-type: none"> <li>master / slave outdoor unit communication failure</li> </ul>
	X	X	X	72-6		<ul style="list-style-type: none"> <li>Over connection of capacity units</li> <li>Too many indoor units connected</li> </ul>
LE	X	X	X	75-1~3	Igniter voltage	<ul style="list-style-type: none"> <li>Supply electro magnetic gas valves failure</li> </ul>
LF	X	X	X	84-0	Operation failure	<ul style="list-style-type: none"> <li>Starter failure</li> </ul>
LJ	X	X	X	75-0		<ul style="list-style-type: none"> <li>Refrigerant gas empty</li> </ul>
P8	X	X	X	74-1~4 74-6 82-0~1	Engine	<ul style="list-style-type: none"> <li>master / slave outdoor unit communication failure</li> </ul>
PE	X	X	X	74-7	Gas valves	<ul style="list-style-type: none"> <li>Over connection of capacity units</li> <li>Too many indoor units connected</li> </ul>
PF	X	X	X	60-0	Starter	<ul style="list-style-type: none"> <li>Supply electro magnetic gas valves failure</li> </ul>
U0	X	X	X	88-5	Ref. Piping	<ul style="list-style-type: none"> <li>Starter failure</li> </ul>
U7	X	X	X	4-0~6	Communication	<ul style="list-style-type: none"> <li>Refrigerant gas empty</li> </ul>
UA	X	X	X	43-0,1 44-n	Indoor unit number	<ul style="list-style-type: none"> <li>master / slave outdoor unit communication failure</li> </ul>

## NOTE







CE

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